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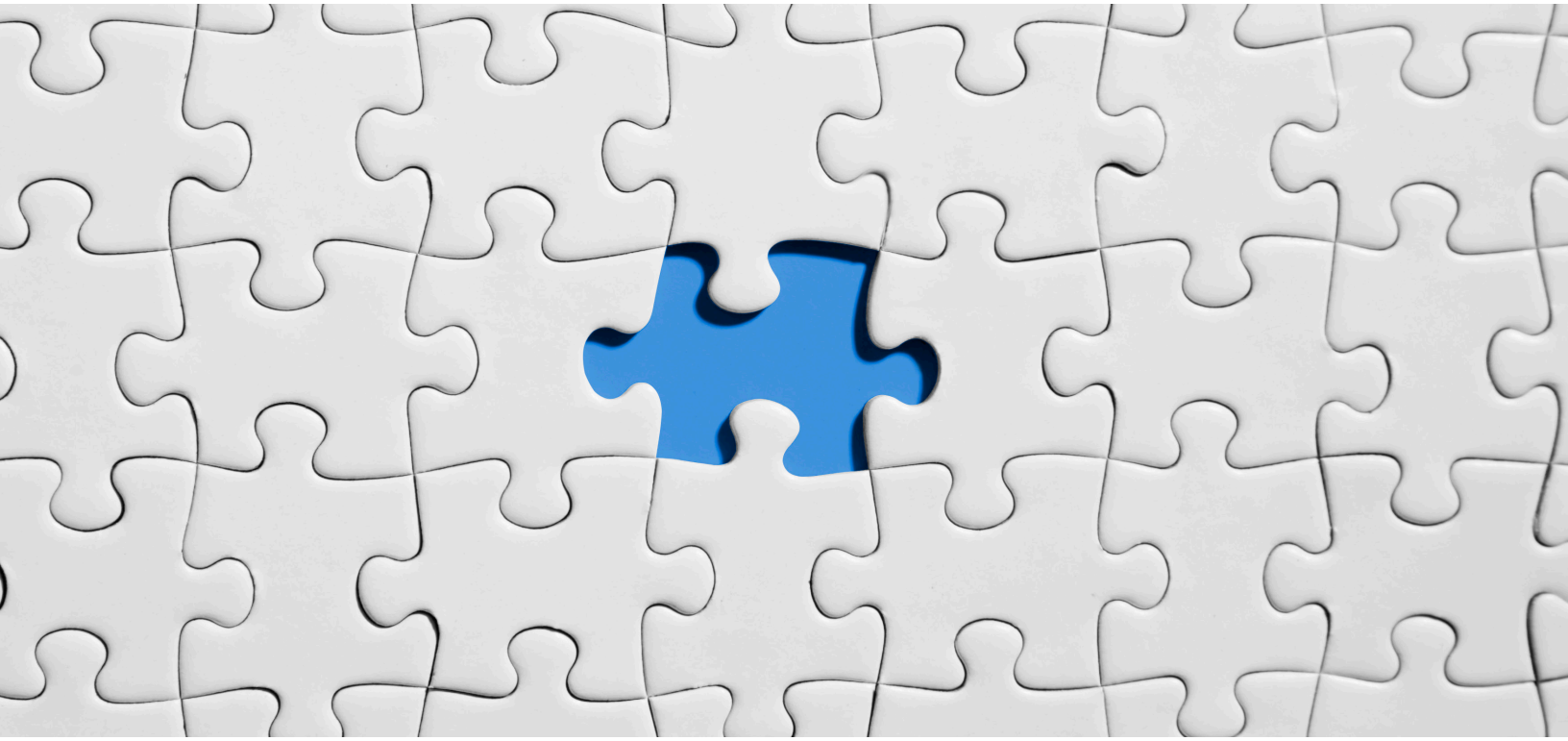
# IMPLEMENTATION OF AI/ML IN M&E VERTICAL

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Knowledge Sharing Article



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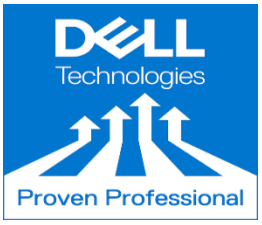


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## Table of Contents

# Introduction

## Artificial Intelligence

Artificial Intelligence (AI) is a simulation of Human intelligence into machines, where a machine is trained to think like humans and can be programmed to exhibit Human actions. Speech recognition, calculators, Learning and Planning, and face detection are a few examples of Machine Learning.

There are 3 types of AI:

**Artificial Narrow Intelligence (ANI)**

This is one of the most Basic concepts of AI. The intelligence learns a single task which it has to perform efficiently and intelligently, i.e. Voice Assistants.

**Artificial General Intelligence (AGI)**

Unlike ANI, it can learn and improve itself to perform various tasks. It is General Purpose and comparatively as intelligent as the Human brain, i.e. AlpaGo, though only able to play Go. Its intelligence can be applied in other fields as well.

**Artificial Super Intelligence (ASI)**

The most superior intelligence, ASI is more powerful and sophisticated than a Human's Intelligence. It can think about abstractions that are impossible for Humans to perform.

## Machine Learning

Machine Learning (ML), a branch of AI, concerns the construction and study of systems that can learn from data.

***"The goal of machine learning is to build computer systems that can adapt and learn from their experience."*** **Tom Dietterich**

Machine Learning can be classified into:

**Supervised Algorithm**

Algorithms that are trained on labeled examples, i.e. input where the desired output is known.

Examples of Supervised Algorithms are Linear Regression, Logistic Regression, KNN classification, Support Vector Machine (SVM), Decision Trees, Random Forest, and Naive Bayes' theorem.

**Unsupervised Algorithms**

Algorithms that operate on unlabeled examples, i.e. input where the desired output is unknown. K Means Clustering is an example of an Unsupervised Algorithm.

**Semi-Supervised**

Combines both labelled and unlabeled examples to generate an appropriate function or classifier.

## How AI is changing Media and Entertainment

Figure 1 shows the increased AI spending pattern since 2016 and how the industry is ready to invest in AI in the coming year. Adhering to the popular adage that 'Data is the new Oil', companies are investing to transform their IT infrastructure in the same way as companies had done long ago to accommodate a transformation to oil-driven businesses. Managing and delivering AI is playing a crucial role in the Media and Entertainment industry, starting with content creation.

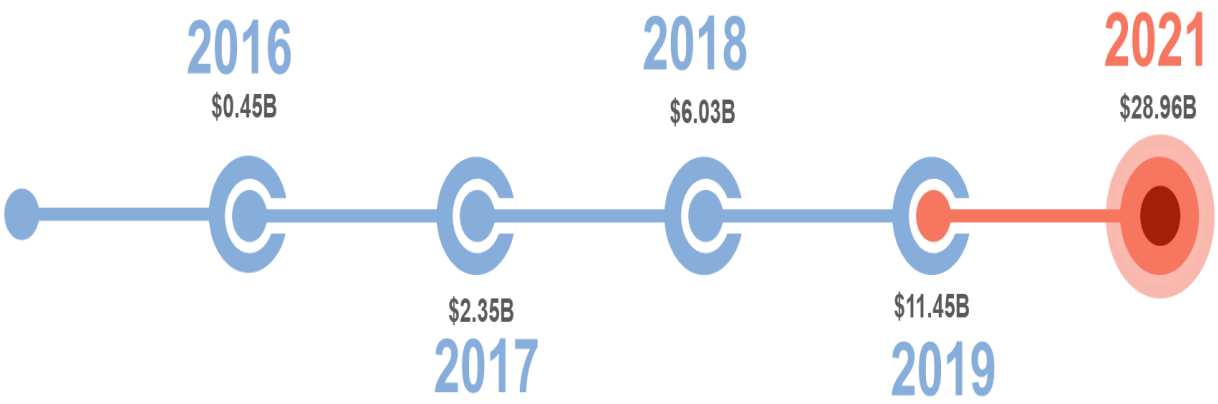


**Figure 1**

AI investment has turned into a race for patents and intellectual property (IP) among the world's leading tech companies. A McKinsey Global Institute study reported that tech giants including Baidu and Google spent between $20B to $30B on AI in 2016, with 90% of this spent on R&D and deployment and 10% on AI acquisitions.

U.S.-based companies absorbed 66% of all AI investments in 2016 while China was second with 17% and growing fast.

By providing better search results, Netflix estimates that it is avoiding canceled subscriptions that would reduce its revenue by $1B annually.

## Introduction to AR & VR

We see AI becoming a new form of entertainment media through virtual reality (VR) and augmented reality (AR) technologies offering fully immersive experiences with intelligent avatars.

The origin of VR and AR came way back in 1838, when Charles Wheatstone invented the stereoscope. This technology used an image for each eye to create a 3D image for the viewer.

Virtual reality is now used by the news industry to regain their credibility.

The reason why VR is so essential is that it puts a supplementary sense of participation in the minds of viewers. To fix the media's broken trust, putting viewers at the center of events can make them feel like they are directly participating in the event; a wise way out.

Now with the introduction of VR in the news industry, the role of the journalist is even more challenging. For example, while shooting with a VR camera, cropping a scene or zooming in will create bias. How far can you stretch the definition of transparency for a journalist in the VR world is the main question here. You might crop something because it was irrelevant but it might be an essential element for the viewer.

There would be some ethical challenges as well. For example, in a world which is increasingly violent, how appropriate is it to make the viewers virtually experience a scene of gore, death and other disturbing news events?

The good news for the news industry is life-like and immersive experiences are not limited to just VR. In the media and entertainment world, AR can also be used for content delivery.

AR is particularly appealing to those who prefer to explore the world and experience action with AR technology to intensify their real-life experiences. Let's recollect AR with your Snapchat filters or the Pokemon Go game, where selfies had overlays of animated filters. Now, AR can be used to augment the various other aspects of our environment and experience as well.

## 3 Reasons Why M&E industry should Embrace Machine Learning

Here are three ways that machine learning and intelligent automation tools can help the media and entertainment industry save costs, deliver an engaging experience for users and increase the value of data.

### Enhanced Content Discovery

Media companies highly relied on the basic metadata like title, episode, or keywords to discover, but this data is too advanced for some archived content. Suppose you would like to watch your favorite actor wearing a blue suit in a Rolls Royce which they used in his new movie. How would we search this information? By building keywords to include the props in a scene, specific actors and guests, as well as themes and emotions, content libraries can be sliced and diced more effectively.

Digicaption was one of the companies which used to write subtitles for movies. Imagine if we can do that for all the languages in the world and all the movies in those languages – sounds like a nightmare! Addition to that manually including the actors information, the props they use, etc. – sounds even crazier! Even if you want to do this, how much time and money would be spent to have humans do this? Instead, ML, natural language processing (NLP) and image processing technology can be used to filter structured and unstructured data. The rich Metadata can be used to drive the Enhanced Search, even recommend and create relationships between previously linked content which drives deeper engagement with viewers.

### Cost Savings

Personalization is the key to success in the streaming platforms for the target audience. Companies no longer deploy one display for all the customers. Rather, they like to personalize according the viewer's needs and interests. With Enhanced Metadata and scene-level identification of each piece of content from TV episodes to new stories or new series, the right content is placed in front of the consumer. Machine learning tools enable identification of content topics and tag metadata from live or linear streams in significantly less time and with less effort compared to editors and producers, as computers

sort and classify this content in real time. Leveraging this enhanced metadata enables automated clip and highlight creation and enables users to search more effectively to find those micro-moments important to creating a personalized viewing experience.

## Monetization Opportunities

When we are watching any of our favorite series or movies on YouTube, how many times are we annoyed by the ads which interrupt. M&E companies are gaining efficiency and increasing the user experience, complex metadata and a built-out tagging structure which creates a huge opportunity for advertisers to deliver specific, relevant content to their target audience. A user wishing to opt out of the ads might have to pay a premium to avoid them. Or, if they view them, the companies generate ad revenue. In either case, its a win-win situation for such companies.

By leveraging intelligent automation, advertisers can match the right ad to their demographic based on the user's history on the platform or target a precise moment within a video with a similar sentimental tone to your brand. With a deep library of content, media and entertainment companies can re-activate their earning potential without incurring the costs associated with manually updating metadata specs to match current standards. This can prepare content for subscription video on demand (SVOD) or even enable deeply interactive experiences to previously flat content.

## Issues that have made changing existing Businesses Operating model Imperative.

- **Media companies increasingly lack control over last-mile delivery mechanisms and platforms**

Today's media companies often have little to no control over how their content reaches consumers. People could be using any combination of device and transport mechanisms to read or view content. Due to this, it is essential that media companies collect, analyze, and deploy operational data to flag potential problems with a partner—whether a carrier, a device manufacturer, or an over-the-top service provider—that could affect the consumer. Putting data-driven self-healing systems in place using machine learning technologies is an increasingly common proactive stance media companies must take today to ensure that users can consume content when and how they want to without hiccups.

- **Advertising budgets require hard ROI**

The latest CMO Survey found that 61 percent of CMOs are under pressure from their CEOs to prove that marketing adds value to the business. Media companies, in a chain reaction, are under the gun to provide hard evidence that placing advertising with them represents good business investments. In Jack Marshall's Wall Street Journal blog post, Facebook's vice president of measurements and insights, Brad Smallwood, is quoted, "We're pushing the industry to actually think about business outcomes, and the causation marketing is driving as a success metric, as opposed to proxy metrics that aren't even particularly good to look at."

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## Applications of AI in M&E

**IRIS.TV – Recommendation and Personalization**

Reportedly driven by machine learning, IRIS.TV offers a B2B service to support companies in tracking and improving client interaction with their digital content. Examples of media company clients include Hearst Digital Media, CBS and the Hollywood Reporter.

**McCann Erickson Japan – "AI Creative Director"**

In March 2016, advertising agency MaCann Erickson Japan reportedly launched an AI creative director called AI-CD ß. The company claims this is the first robotic creative director developed using artificial intelligence. AI-CD ß was officially hired on April 1, 2016 along with 11 other human employees.

**Netflix – Machine Learning Workflow Management**

When it comes to on-demand entertainment, personalization of the user experience has shifted from a luxury to a user expectation. For example, according to its 2016 annual report Netflix boasts 93 million global members streaming over 125 million hours of TV shows and movies per day. Predicting what a user wants to watch is a key part of the company's business model. Machine learning is reportedly integral to streamlining the diversity of user preferences.

**Fox and IBM Watson – Morgan Film Trailer**

In August 2016, IBM announced the release of the trailer for a 20th Century Fox suspense/horror film *Morgan* reportedly developed using machine learning. The research team trained the AI system on scenes from "100 horror movies." Features from each of the movie scenes were categorized into what the team called "moments" and were then analyzed based on visual, audio and scene composition elements.

## Google Cloud Platform Machine Learning

The Google Cloud Platform (GCP) allows enterprises to research AI/ML and deploy advanced ML models without the need for a team of data scientists. With a wide selection of pre-trained ML models and easy-to-use tools that allow developers to build and train their own, GCP advances Google's mission to make AI and ML easy, fast, and useful for all developers and enterprises.

**Easily build and train custom ML models with Google Cloud AutoML**

For use cases that fall outside the pre-trained APIs, there is Cloud AutoML, which is currently in beta. Using a graphical interface, developers without extensive machine learning knowledge can build and train custom ML models for specific business needs.

- AutoML Tables is a no-code solution that allows anyone, whether a data scientist, developer, or analyst, to build and deploy ML models on structured tabular datasets and incorporate them into wider applications. Models can be designed and deployed within days, as opposed to weeks. Fox Sports used AutoML Tables to build a model that successfully engaged Australian

cricket fans by using historical data to predict when wickets would fall five minutes before a pitch.

- AutoML Vision, which was recently updated to support functionality at the edge, builds, trains, and optimizes models for use in applications in the cloud or at the edge to derive insights from images.
- AutoML Video Intelligence is a video analysis and annotation solution that allows developers to use custom labels. Use cases include creating highlight reels or automatically removing commercials.
- AutoML Natural Language uses machine learning to reveal the structure and meaning of text to glean more insight from social media sentiment and customer conversations.

**Deploy pre-trained ML models with GCP machine learning APIs**

GCP's pre-trained, optimized ML models are great when an enterprise wants to get started with a specific use case quickly. Available APIs include:

- Google Cloud Video Intelligence, a REST API that allows developers to access Google's video analysis technology to annotate entire videos, segments, shots, or frames with contextual information. Possible use cases include detection of labels, explicit content, and shot changes, as well as regionalization features.
- Google Cloud Vision API enables applications to access vision detection features. Possible use cases include detecting labels, faces, logos, and landmarks, performing optical character recognition (OCR), and tagging explicit content within images.
- Google Cloud Speech API, which supports over 110 languages and variants, allows applications to integrate speech recognition technologies for purposes of subtitles, closed-captioning, and other use cases where audio must be transcribed to text.
- Google Natural Language API enables applications to perform sentiment analysis, entity analysis, entity-sentiment analysis, content classification, and syntax analysis. Use cases include sentiment analysis of online film and TV reviews.
- Dialogflow Enterprise Edition enables users to build chatbots and other interactive, natural-sounding conversational interfaces for websites, mobile applications, popular messaging platforms, and IoT devices. Dialogflow can analyze multiple types of input, including text and audio, and can respond to consumers using text or synthetic speech.